Meeting the Urgency for Document Delivery in Clinical Medicine

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A Document Delivery library project was designed to improve delivery of information to health professionals in the Washington DC/Baltimore area. The project goals were to enhance delivery of full text documents and accelerate interlibrary loan services. The aim was to provide direct library services in the clinical arena by facilitating access to the articles needed by practitioners and clinical investigators. The objectives were to (1) design, develop and implement a comprehensive Document Delivery System (DDS) for the Library Information System (LIS) which included interlibrary loan, photocopy services and facsimile transmission capabilities; (2) establish a multi-university Library Knowledge Network for resource sharing; and (3) evaluate the project.

The DDS and facsimile service are described and project data and outcomes are reported. Today, the participating libraries can use electronic means to share interlibrary loans. Georgetown users have responded favorably to the DDS and Fax services.

BACKGROUND

Health science professionals depend heavily upon access to a variety of information resources to make intelligent and informed choices for patient care management and medical research. Libraries and librarians who serve this type of clientele face a dilemma. Information and knowledge continue to grow exponentially, while the purchasing power of resource dollars to build collections decreases. The growth of library collections has stabilized, while the urgency and user demands for information has escalated. Consequently, it has become increasingly necessary to modernize traditional library resource sharing mechanisms and to experiment with new technologies to improve services.

Several authors have concluded that a solution for libraries lies in building and strengthening networks and engaging in resource sharing projects [1-3]. In 1975, de Gennaro suggested that the emphasis for libraries should shift from holdings and size, to access and services. He predicted that computer technology would have its greatest payoff for libraries as a tool to assist librarians in developing and operating networks and other mechanisms for resource sharing [4]. In 1982, Kronick reached the same conclusion, that libraries could no longer afford self-sufficiency and that a more attainable goal was "mutual sufficiency [5]." Electronic resource sharing in the mid 1980s focused on automated systems and intelligent gateways and networks such as Octanet to locate requested materials [6-8]. There were experiments with facsimile in the late 1980s [9-10] but the trend really emerged around 1990 [11]. In 1992, the RLG ARIEL software system was developed which used scanners, telefacsimile and Internet for document delivery [12]. The Georgetown system was launched in 1989 and was ready for users in 1992.

DOCUMENT DELIVERY SYSTEM

The Georgetown University Medical Center Library was awarded a three year Department of Education grant in 1989 to develop a Library Knowledge Network: Document Delivery System (DDS). The project consisted of three phases: development, implementation and evaluation. In phase I, a prototype document delivery was developed that allows a user to look-up items on the Library's Knowledge Network which includes a family of bibliographic and informational databases implemented over the past ten years [13-15]. The first step was to link the Library Information System's (LIS) OPAC and the miniMEDLINE database of journal articles. In phase II, access to ALERTS/CURRENT CONTENTS was developed and a FAXmail service was established [16]. Phase III implementation and evaluation was handled in year three and it resulted in modifications with release of the DDS to library users in January 1992.

The capabilities are as follows: There are two access points for document delivery, the LIS OPAC and bibliographic databases. Documents are available through interlibrary loans or photocopy services.

1. **Photocopy service** is available for items which the library owns. The document delivery options include mail, fax or pick-up and a payment mode.
2. **Interlibrary Loan, an electronic request form:** If the user determines through the OPAC that the Library does not own an item, an interlibrary loan screen can appear online for completion by the user. It also includes delivery and payment options.

Library staff review the electronic loan requests and transmit them first to participating libraries and if necessary to OCLC or DOCLINE.

ACCESS METHODS

A. The LIS OPAC provides two different ways for requesting documents from the DDS. Users can

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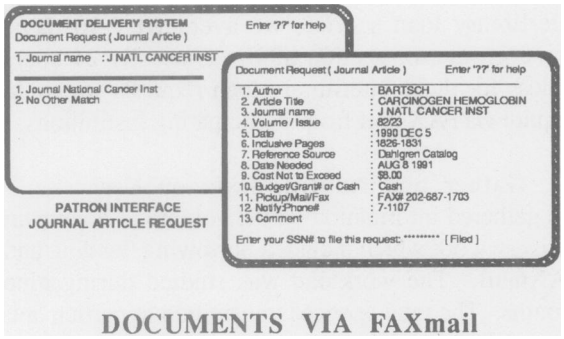
request books or journal articles by pressing "D" while viewing the electronic card image. This is the simplest method and allows patrons to request items with minimal keystrokes and thus reduces the potential for errors and the time spent making a request. Users can also fill out an electronic form. This form is an automated replacement of the paper form to be used for ILL requests.

B. The Bibliographic Databases: The miniMEDLINE and ALERTS/CURRENT CONTENTS modules allow a library patron to select articles for document delivery while viewing the bibliographic record. Once selections are made, the bibliographic data is automatically transferred to the electronic form. Patrons only need to enter method of payment and mode of delivery.



In phase II, the facsimile component of the project was implemented. Fax machines were acquired and a program was launched to test and modify an electronic interlibrary exchange and a Georgetown campus service. Four medical libraries (Georgetown University, Howard University, Johns Hopkins University and University of Maryland) implemented the FAXmail service and developed methodology for a controlled study including time frame, quantity, costs per item and delivery turn-around time. The Georgetown campus service also established guidelines for in-house departments participating in the experiment. Data on the new services and network was gathered.

A. FAXmail - Interlibrary Network: The four medical libraries developed initial criteria, request forms and data collection guidelines. It was agreed to study the service over a 12-month period while each of the four libraries would lend 100 articles to the other three libraries for a total of 1000 transactions. Even though Howard University was not a heavy borrower, because their collection is so strong, we managed to test a total of 853 transactions during the 12 month period as shown below.

FAXmail Requests Reported by Cooperating Health Science Libraries
February 15, 1991 - February 14, 1992

	Borrowing	Unfilled	Total	Lending	Unfilled	Total	Total Transactions
Georgetown	97	8	105	61	11	72	177
Howard*	18	2	20	66	0	66	86
Johns Hopkins	103	41	144	145	21	166	310
UMAB	116	34	150	110	20	130	280
Total	334	85	419	382	52	434	853

* Howard has a strong collection and does not need to borrow heavily

B. FAXmail - Georgetown campus: The campus FAXmail service began in January, 1991, with six participating departments (Pharmacology, Ophthalmology, Otolaryngology, Pediatrics, Surgery, and Physiology). Fax machines were given to three departments: Pharmacology, Otolaryngology, and Pediatrics. The other departments found funds to purchase their own fax machines. To implement the study, procedures and forms were developed and distributed. During the test period, the library filled and faxed 163 articles totalling 1,360 pages. Delivery time was the same day or within 24 hours for photocopy or interlibrary loans. However, requests to OCLC and DOCLINE averaged 7 to 10 days (see figure below).

Summary of FAXMail Requests by Georgetown Faculty by Department
January 1991 - February 1992

	# Articles	# Pages
Ophthalmology	5	47
Otolaryngology	19	89
Pediatrics	55	325
Pharmacology	76	815
Physiology and Biophysics	4	20
Surgery	4	64
Total	163	1,360

The delivery time usually was the either the same day or within 24 hours for photocopy service, and interlibrary loans we faxed to other participating libraries. Requests we filled via DOCLINE or OCLC averaged 7 to 10 days.

HARDWARE

The equipment for the project was acquired in progressive stages.

1. Macintosh workstations were selected for the user test stations because they strengthen the design, testing, user acceptance and evaluation components.

2. The programmer's workstation, only a terminal networked to the LIS, was upgraded to a Macintosh workstation for compatibility.

3. The facsimile machines for the participating libraries and departments were acquired and installed. This included machines for Howard University, Johns Hopkins University, Georgetown University and three departments. (Maryland did not need a machine).

ORGANIZATION AND EXPENSES

The key project personnel included the Library Director, Associate Librarian, Assistant Director for Computer Services, two systems programmers and a library technician. Other library members included the access services librarian, circulation, and interlibrary loan assistant. Each had specific tasks to develop and review the software, train users, transmit and receive photocopied documents. A committee of librarians from the four libraries developed policy plans and implemented the network service. The participating departments volunteered to engage in the facsimile evaluation and to cover the photocopy costs for their articles.

The contributions by Georgetown far exceeded the anticipated estimates. Staff time devoted to the project doubled. We also upgraded the minicomputer system where the Document Delivery System (DDS) resides.

EVALUATION AND IMPACT

The evaluation, conducted in Phase III, consisted of monitoring system use, gathering and analyzing data on document delivery, FAXmail, queries of network users, exchanges with participating libraries, and costs.

A. Monitor System Use

• **Point of Use:** The DDS was accessed directly by a total of 3,610 users; patrons 2,035 (57%) and staff 945 (26%), as well as via the Dahlgren Online Catalog 152 (4%), miniMEDLINE 429 (12%), and ALERTS/CURRENT CONTENTS 49 (1%). We were surprised by the high volume and how quickly end users became the heaviest users. They learned to request loans and photocopy service quickly during a nine month period (see chart below). We expect that next year the number of staff entered requests will decrease as faculty, students and researchers become more familiar with the DDS and less reliant on the former method of filling out manual request forms. Direct end-user access through the OPAC and the bibliographic databases are expected to increase at a fast pace.

Document Delivery System
Activity Summary: Photocopy and ILL Borrowing
January to September1992

	Photocopy Service	Interlibrary Loan Borrowing	TOTAL
Direct Access:			
End-Users	492	1,543	2,035
Library Staff	497	448	945
Subtotal	**989**	**1,991**	**2,980**
Bibliographic Databases:			
Online Catalog	113	39	152
miniMEDLINE	376	53	429
ALERTS/CURRENT Contents	11	38	49
Subtotal	**500**	**130**	**630**
Total	**1,489**	**2,121**	**3,610**

• **Identify the User:** Medical center faculty, students and staff made 91% of the requests via the DDS. Main campus university faculty, students and staff made 7% of the requests, and library subscribers made 2% of the requests. We expect these percentages to remain rather consistent in the future.

Document Delivery System
Activity Summary: Photocopy and ILL Borrowing
January to September1992

Patron Class	Photocopy Service	Interlibrary Loan Borrowing	TOTAL
Basic Science	230	462	692
Medical	341	549	890
Nursing	42	47	89
Hospital	707	762	1,469
University	51	188	239
Library	42	106	148
Other	76	7	83
TOTAL	**1,489**	**2,121**	**3,610**

• **Transaction Time:** The average transaction time for photocopy service was 24-48 hours. For interlibrary loan service, we averaged 7-10 days; however, the transaction time was usually 24 hours or less for those interlibrary loan requests we could acquire via FAXmail from participating institutions.

B. Gather and Analyze Data on Use

We gathered information on the volume of document delivery work which included borrowing, lending and FAXmail. The workload was studied during nine months. The total services transmitted to participants was 4,959 articles and 40,620 pages. The Georgetown FAXmail service transmitted 163 articles and 1360 pages, which averaged 8.34 pages. Monthly logs were maintained.

Document Delivery System:Volume of Work
January to September1992

	Articles	Pages
Photocopy Service	1,489	12,860
Interlibrary Loan Borrow	2,121	16,968
Interlibrary Loan Lend	1,349	10,792
	4,959	**40,620**

FAXMail:Volume of Work
January 1991 - February1992

Articles	Pages
163	1,360

Summary of FAXMail Requests by Georgetown Faculty by Month
January 1991 - February 1992

Month	Articles	Pages
January 1991	5	175
February 1991	16	116
March 1991	22	240
April 1991	30	217
May 1991	0	0
June 1991	2	21
July 1991	27	191
August 1991	2	13
September 1991	4	26
October 1991	5	64
November 1991	13	107
December 1991	12	61
January 1992	15	82
February 1992	10	47
TOTAL	**163**	**1,360**
Average 8.34 pages/article		

• **Costs of Service:** The data on volume, distribution and service was reviewed and a cost study was conducted. The cost study showed that a local fax cost $8.06, long distance fax is $9.86 and $1.00 to receive a fax.

Based on the cost study analysis, the Library decided to change the fee structure because it costs much more to provide the service than we charged which was $.40 to pull a journal and $.20/page for photocopy service. Although the library still subsidizes these services, we now charge a flat fee of $5/article for photocopying service and a flat $8/item for all interlibrary loans. We have found that the flat rate approach is less confusing and allows the patrons to know in advance the exact charges.

C. Evaluate Network Access and System Performance

• **Institutional Evaluation of the Network:** There are three parts to the network evaluation study. The first, is use of the Knowledge Network and the DDS. The second, is the FAXmail service, and third is Clinical Data. Generally, the impact was positive with rapid user acceptance.

• **The Knowledge Network:** We studied use of the Knowledge Network during a nine month period to determine how use of the DDS compared to some of our existing systems. The evidence shown in the chart below substantiates our assessment of favorable acceptance by users. The databases are largely clinical and are heavily accessed from the hospital. The heavy use of the DDS, the newest module, during nine months shows that users really needed this component to round-out their bibliographic searching. They conduct bibliographic searches and simultaneously access the literature quite readily.

• **The FAXmail Service** was studied for a 12 month period by surveying faculty users in the 6 participating departments. They ranked the service on a scale of 1(poor) to 5(excellent). Service satisfaction scored high mostly 4 to 5 and legibility ranked well (see figure below).

• **Clinical Data:** Use was primarily for clinical research, patient care and scholarly publications. Clinical pharmacology, Pediatrics, Otolaryngology, Physiology, Ophthalmology and Surgery participated in the fax service. All participating departments are based in the hospital except Physiology. The major use was clinical research 50% and direct patient care 8% which totaled 58% (see chart below). Scholarly publications 42% covered research, patient care data and education. The uses made of the Fax service for research and scholarly publications were by faculty and staff who conduct a wide range of clinical research programs at Georgetown. The Pharmacology department, a heavy user of our FAXmail service, has an active program in clinical pharmacology and conducts a number of clinical trials.

Use of Knowledge Network
January - September 1992

Database	Sessions
ALERTS/CURRENT CONTENTS	4,385
BIOETHICSLINE	733
Clinical Alerts	458
Online Public Access Catalog	13,537
Document Delivery	3,610
Drug and Poison Info	1,504
Drug Interactions	432
DXplain	1,291
E-Mail	23,667
Faculty Publications	572
George (Lauinger Library Catalog)	1,466
GRATEFUL MED	139
G.U. Science Calendar	416
miniMEDLINE	27,071
Molecular Biology	3,642
NIH Guide	671
PDQ	587
RECONSIDER	744
TOTAL	**84,925**

Evaluation of FAXMail Service to Georgetown Faculty
January 1991 - February 1992
(based on rating scale of 1(poor) to 5 (excellent)

Document Transmission
Timeliness
5-36%
4-55%
3-9%
All pages received
5-27%
4-64%
2-9%
All pages complete
5-36%
4-55%
2-9%
Document Quality
Legibility (text)
5-9%
4-82%
3-9%
Legibility (Graphs, tables, etc)
5-9%
4-82%
3-9%
Legibility (photos)
5-11%
4-89%

Cost of Service
N/A-56%
4-33%
3-11%
Overall Satisfaction
5-18%
4-73%
1-9%
Purpose of Document
Clinical Research 50%
Patient Care 8%
Scholarly Publications 42%

100% planned to continue use the FAXMail service.

• **Satisfaction of Participating Libraries:** The overall satisfaction with the FAXmail project was good. Transmission of requests and delivery time was accelerated greatly. However, because we failed to ask the participating libraries to forward unfilled requests, those were delayed 1-3 days longer than the regular routing (DOCLINE or OCLC). Also,

although the patron received the request much quicker, fax service took more staff time.

FAXMail Requests Reported by Cooperating Health Science Libraries February 15, 1991 - February 14, 1992

	Johns Hopkins	UMAB	Georgetown	Howard
Transactions:				
Borrowing	103	116	97	18
Lending	145	110	61	66
Unfilled	62	54	19	2
TOTAL	310	280	177	86

• **Maintenance/Downtime:** The fax machine required no maintenance during this time period. Automatic dial-up was helpful, however there were so many different fax machines in each of the departments, it was impossible to program all the fax numbers. Based on the FAXmail evaluations, the document text quality was good to excellent for 91% of the transmissions and average for 9%. Photocopy quality was reported to be good to excellent for 100% of the transmissions.

SIGNIFICANCE

The project has allowed Georgetown to implement a creative document delivery service for physicians and nurses who often cannot come to the library to get the articles they need. Clinicians gravitated to the DDS and Fax service almost immediately. By having rapid delivery of articles via facsimile, they can make more informed decisions about patient diagnosis and treatment modalities and they can now use the online integrated document delivery module to request articles.

In 1989, prior to this project the four libraries were individually struggling with decisions about applications of modern technologies and the kind of facsimile service they could provide to community libraries. Today, the participating libraries have gathered and provided useful data on the demand, cost and value of an electronic transmission service. We gained experience with facsimile transmission and found it invaluable for emergency requests. Previously, document delivery service was manual, users had to fill-out requests forms and the library staff had to maintain manual records. Today, these procedures are conducted electronically, faster and more efficiently.

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